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ABSTRACT

Three alternative strategies for college selection, their associated cost and benefits are described in this study. These include a strict meritocratic procedure, a minority quota procedure and a disadvantaged quota procedure. The strict meritocratic procedure was operationalized in terms of predicted probability of success; the minority quota procedure was operationalized in terms of race/ethnicity and predicted probability of success; and the disadvantaged quota procedure was operationalized in terms of poverty status and predicted probability of success. Data for these analyses were derived from the weighted sample of the National Longitudinal Study of the High School Class of 1972. Applicants for four-year colleges or universities with SAT or ACT scores provided the rates employed for analyses. The strict meritocratic selection procedure resulted in substantial under-representation of minorities, with applicant population parity accomplished only with admission of all applicants. Under the minority quota selection method, the admission standard for minorities apparently needs to be about 15 percent less than the standard for Whites; while under the poverty quota selection method, the standard for below poverty applicants apparently needs to be at least 30 percent less than for above poverty applicants.
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A Comparative Analysis of Three Admission/Selection Procedures

The use of admission tests over the past few years, as well as some of the concomitant legal decisions, have resulted in the need for a review of plausible alternative selection procedures. The purpose of this discussion is to describe three strategies with their associated costs and benefits.

Most selection procedures use some form of standardized admission test (e.g. MCAT, LSAT, GRE, SAT, ACT), a measure of past academic performance (e.g. grade point average), and one or more subjective judgments derived from interviews, recommendations, etc. Frequently, the admission test and past academic performance are used as a "first cut" to screen out applicants and reduce interviewers' burden. The use of these measures is based upon their predictive power, or the ability to predict accurately, with respect to post-selection performance. Most studies of this predictive power have found error proportions from 40 to 70 percent. In spite of the imperfect relationships, these selection indices currently constitute the basis for the majority of selection procedures. Perhaps their retention has been based upon their simplicity and the lack of anything better.

Traditional Selection Procedures

The traditional selection procedure employs the admission test scores, past academic performance, and post-selection performance of previously admitted students to determine the relationship of admission test scores and past academic performance to success. In most cases this relationship is described as a linear function.

Figure 1 displays a hypothetical relationship.

When the linear relationship is used for selection, the success values are unknown in that success requires admission and years of observing performance. Assuming the relationship is stable from year to year, a student may be assigned an "expected success" value based on his admission test scores and prior academic performance by using the relationship. Regrettably, each "expected success" score probably differs from the "true success" score, or the success score the student would earn if admitted. This difference (true to expected) is error. The amount of error in system depends upon the predictive power of the relationship and the variety of previous applicants and admissions.

Theoretically, the admission standard (i.e. required combination of admission test scores and prior academic performance) is determined by the degree of success desired by the institution. Figure 2 displays this theoretical process. In Figure 2, the desired degree of success is determined by the institution to be point DS. From DS, the admission standard is determined by the linear relationship to be point AS.

The ellipsoidal region in Figure 2 represents the general error about the linear relationship. Due to this error, two specific types of errors result with this selection procedure. First, some applicants with scores below the admission standard would perform above the desired success level if admitted. That is, the procedure misses these applicants' potential for success. Such misses represent a major cost for society in that needed professionals are missed.

The second type of error reflects applicants with scores above the admission standard who fail to perform successfully after admission.

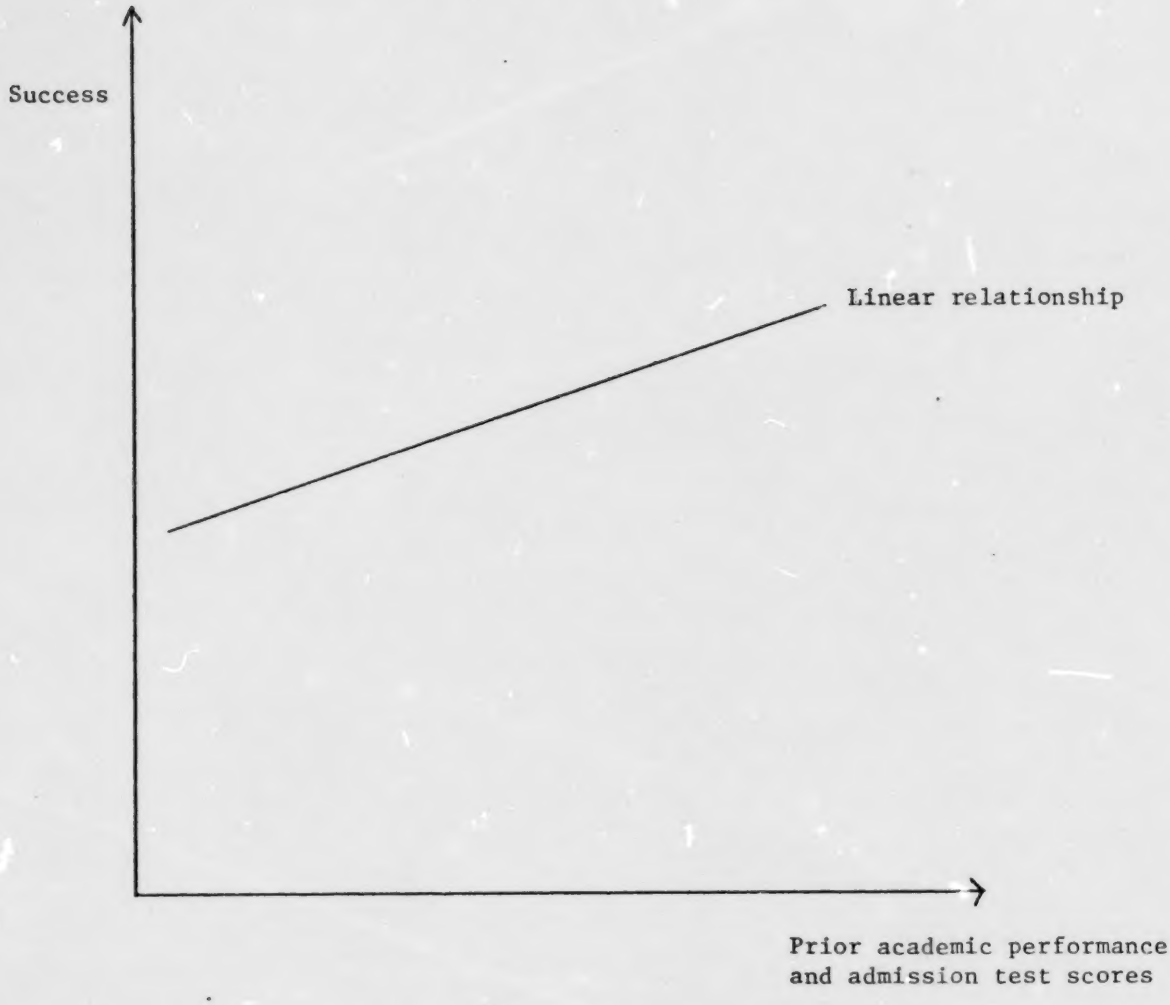

Figure 1. Linear Relationship

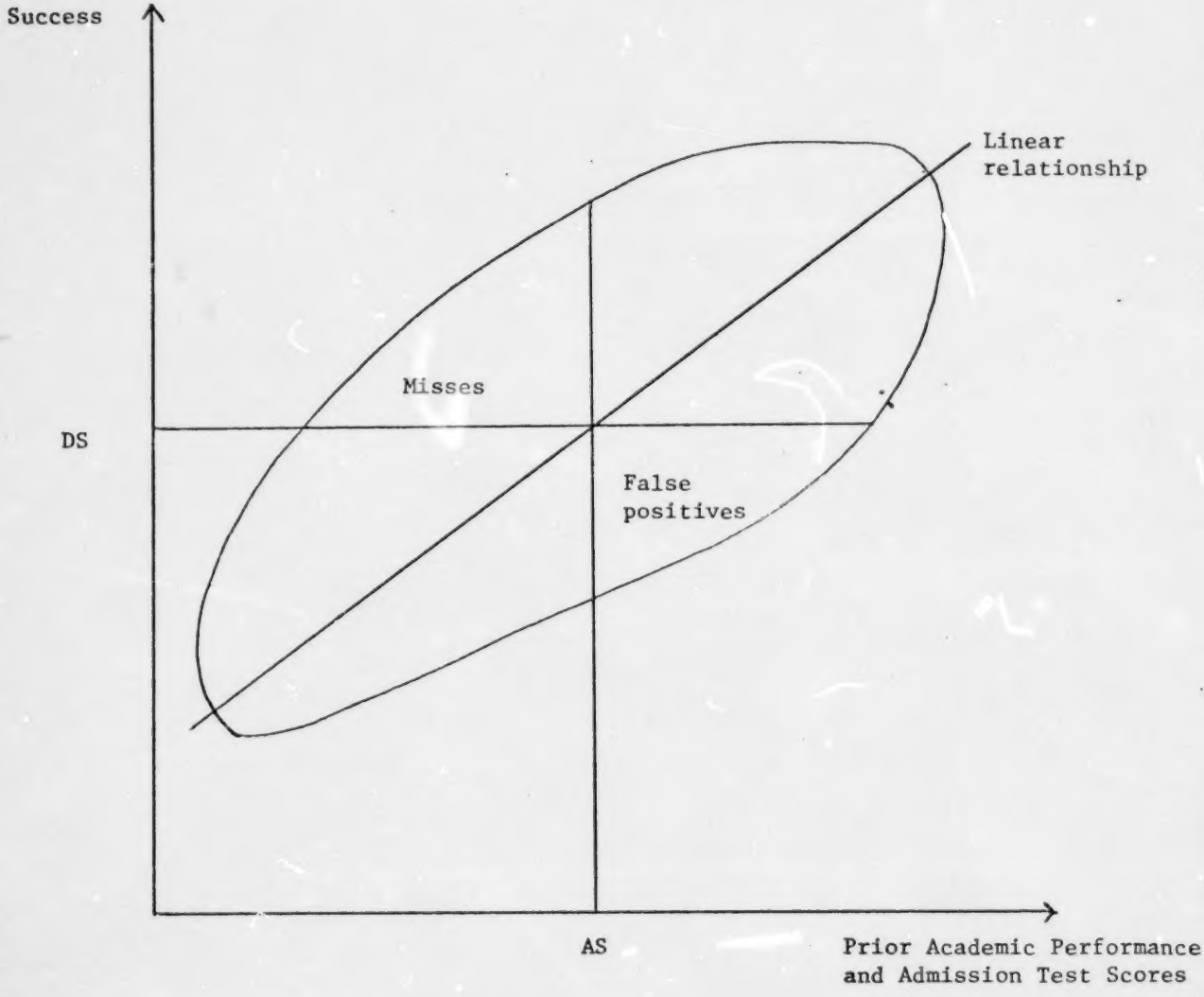

Figure 2. Theoretical Selection

These applicants are falsely identified as having positive potential for success. False positives represent costs for institutions and society in the form of wasted resources.

In an effort to "pick the most qualified" applicants, a rank order procedure may be used. Applicants' scores are submitted to the linear relationship and "expected success" scores are calculated. The applicants' expected success scores are then rank ordered and selection proceeds from highest expected success downward until all available places are filled. This traditional procedure is usually called the strict meritocratic method. The error associated with the meritocratic procedure may be quite large. That is, substantial numbers of misses and false positives may result.

Frequently, administrators using the meritocratic procedure assume the expected success scores of applicants are valid. Indeed, in many cases the possibility of the 140th standing applicant performing better than the 139th standing applicant is ignored. When the degree of error is large, as is typically true, refined relationships are impossible.

The research literature suggests the amount of error associated with the use of one standardized admission test is quite large. To reduce the error, more and better attributes are needed. For example, aspirations, environmental factors, other cognitive variables, and affective variables could be included.

Cultural bias

The use of standardized admission tests has been concomitant with a major problem for selection procedures. The source of this problem is

the failure of minority applicants to score at the same level of majority applicants. Indeed, the average minority applicant's admission test score is frequently substantially below the score of the average majority applicant. This empirical observation has resulted in many conjectures concerning the "fairness" of these tests. In a review of the research literature of this issue, Flaugher[1] presents one unexpected, of not shocking, generalization. That is, the traditional selection procedure tends to over-predict the performance of minority applicants. In other words, the expected success of minority applicants, based on admission test scores' relationship to success, is frequently higher than their actual rate of success.

Concern for fairness for admission tests has led to many definitions of what is fair. The traditional definition of fairness was proposed by Cleary[2] in one of the first studies of tests and selection. Very simply, it states that a test is fair for different groups if the relationship to success that is used neither systematically over-predicts nor under-predicts the level of performance for any group. This definition is intuitively reasonable. The flaw in Cleary's definition is the previously stated failure of minority applicants to score at the same level as majority applicants. It is possible for a test and the selection procedure to be fair (as defined by Cleary), with substantial under-representation by minorities.

Thorndike[3] suggested that the base-rate of success for various groups be determined empirically, then that percentage of the applicant group be selected, whether or not the same cut-off score on the test is

used for each of the groups. Unfortunately, the base rates for success are rarely known and they are difficult to determine. Furthermore, the possibility of differing cut-off scores may not be feasible.

Cole[4/] suggests that a selection procedure is fair when applicants from different groups who would be successful if they were selected, have the same probability of being selected. This definition relies on a dichotomized success criterion and could resemble the rank order procedure for a continuous expected success criterion. In addition, the fact of an increasing ratio of majority to minority as expected success values increase could allow under-representation of minorities.

Darlington[5/] advocated a procedure of adjustment for the expected success scores of the lower-scoring groups of applicants. At issue in this procedure is the task of deciding how much risk of failure one is willing to take, if any, in order to include among those who are selected a number of the lower-scoring groups, who will be successful.

It is very plausible that no definition of fairness will capture all the problems associated with cultural bias. What is needed is an acceptable strategy, to all concerned, for the selection of students.

Problems due to inordinate demand

Many institutions have faced very high demand for placement. This has been especially true for professional schools (i.e. law, medicine, dentistry). The major problem associated with this increased demand has been the creeping admission standard phenomenon. Indeed, one law school experienced increased in admission standards due to demand to the point

that applicants with an 84 percent chance of success were being rejected. In light of the lower average admission scores of minorities, as the admission standard creeps to higher levels, minorities will be less and less adequately represented.

Another difficulty experienced due to increased demand is the restriction of range phenomenon. That is, institutions with creeping admission standards have a diminished capacity to produce a valid relationship to success. Given the degree of error in the relationship initially, increases in this error represent a major problem.

Goals for selection procedure

There are several goals that may be used in a comparison of alternative selection procedures. On frequently used set of goals focus on parity. That is, the end product of the admission procedure should be a group of admitted persons displaying a racial/ethnic composition equivalent to a specific population. One specific population is the total population of the United States. Other frequently advocated populations are the group of applicants for all schools, or the group of applicants for the school in question.

A goal incorporated in most selection procedures focuses upon merit. It is desirous to have the group of selected applicants display a better chance for success than the group of rejected applicants. The goal in this case is to maximize the proportion of admissions displaying success. The methods employed in response to this goal are usually variations of the strict meritocratic procedures, as previously discussed.

Some less frequently observed goals involve the false positive and miss rates. To minimize the false positive rate is equivalent to the meritocratic goal. In addition, minimization of the miss rate is also equivalent to the meritocratic goal for a fixed number of admissions.

Alternative selection techniques

The selection techniques examined in these analyses were a strict meritocratic procedure, a minority quota procedure, and a disadvantaged quota procedure. The strict meritocratic procedure was operationalized in terms of predicted probability of success. The minority quota procedure was operationalized in terms of race/ethnicity and predicted probability of success. Therefore, the minority quota truly involved meritocratic selection of applicants following stratification on race/ethnicity. The disadvantaged quota procedure was operationalized in terms of poverty status and predicted probability of success.

PROCEDURES

Sample

The data for these analyses were derived from the weighted sample of the National Longitudinal Study of the High School Class of 1972.[6/] Applicants for four-year colleges or universities with SAT or ACT scores provided the rates employed for analyses.

Method

Separate regression analyses were employed to predict success of applicants as a linear function of admission scores (SAT or ACT), high school grade-point average, and high school course of study (vocational, general, academic). Success was operationalized as two and one-half

years of persistence in a four-year college or university. Significant predictive relationships were found (SAT, $F = 103.62$, $df = 4/2738$, $p < .0001$; ACT, $F = 33.57$, $df = 6/2093$, $p < .0001$). Based upon these predictive relationships, a predicted probability of success was calculated for each applicant.

The race/ethnicity classifications employed for these analyses were operationalized in terms of under-represented minority and White applicants. The under-represented minorities included Black Americans, Native Americans, Mexican Americans, and Puerto Ricans. Asian American applicants were excluded from these analyses.

Poverty status for each applicant was operationalized in terms of before tax income, family size, and the poverty criteria established by the Department of Labor.

Relative frequencies, or the distributions, of applicants in the groups were calculated using the Statistical Package for the Social Sciences.[7] Missing data cases were progressively eliminated from the analyses. The generated distributions were transformed, by scalar multiplication, to calculate the distributions for a hypothetical group of 10,000 applicants.

RESULTS

The cumulative distributions of applicants, for the hypothetical group of 10,000 are displayed in Table 1. All other analyses were based upon these distributions. As expected from the literature previously cited, the distributions for under-represented minority applicants were substantially different from the distributions for White applicants.

Table 1

Cumulative Distributions of Applicants

Predicted Probability of Success	Under Represented Minority Applicants									White Applicants								
	Below Poverty			Above Poverty			Total			Below Poverty			Above Poverty			Total		
	Admissions	Successes	False Positives	Admissions	Successes	False Positives	Admissions	Successes	False Postivies	Admissions	Successes	False Positives	Admissions	Successes	False Positives	Admissions	Successes	False Positives
85 - 100	0	0	0	0	0	0	0	0	0	0	0	0	18	17	1	18	17	1
80 - 85	0	0	0	1	0	1	1	0	1	2	0	2	132	113	19	134	113	21
75 - 80	0	0	0	5	4	1	5	4	1	19	7	12	412	327	85	431	334	97
70 - 75	0	0	0	5	4	1	5	4	1	41	24	17	815	600	215	856	624	232
65 - 70	3	2	1	26	17	9	29	19	10	87	61	26	1,446	1,049	397	1,533	1,110	423
60 - 65	6	3	3	41	29	12	47	32	15	126	84	42	2,365	1,633	732	2,491	1,717	774
55 - 60	13	7	6	60	45	15	73	52	21	149	91	58	3,425	2,221	1,204	3,574	2,312	1,262
50 - 55	31	17	14	109	77	32	140	94	46	210	110	100	4,528	2,813	1,715	4,738	2,923	1,815
45 - 50	47	23	24	160	102	58	207	125	82	294	143	151	5,544	3,291	2,253	5,838	3,434	2,404
40 - 45	74	35	39	209	126	83	283	161	122	350	167	183	6,464	3,644	2,820	6,814	3,811	3,003
35 - 40	111	50	61	261	161	100	372	211	161	413	176	237	7,218	3,875	3,343	7,631	4,051	3,580
30 - 35	138	55	83	302	188	114	440	243	197	449	180	269	7,823	4,051	3,772	8,272	4,231	4,041
25 - 30	187	74	113	340	209	131	527	283	244	473	186	287	8,217	4,139	4,078	8,690	4,325	4,365
20 - 25	228	84	144	377	217	160	605	301	304	481	187	294	8,454	4,181	4,273	8,935	4,368	4,567
15 - 20	259	97	162	397	222	175	656	319	337	494	189	305	8,629	4,197	4,432	9,123	4,386	4,737
10 - 15	275	102	173	411	231	180	686	333	353	499	190	309	8,690	4,201	4,489	9,189	4,391	4,798
5 - 10	287	103	184	426	239	189	713	342	371	499	190	309	8,743	4,201	4,542	9,242	4,391	4,851
0 - 5	300	103	197	440	240	200	740	343	397	500	190	310	8,760	4,201	4,559	9,260	4,391	4,869

Strict meritocratic selection

The results of strict meritocratic selection are displayed in Table 2. For each category of predicted probability of success, the entries for the race/ethnic and poverty groups were totaled. As can be seen from the minority representation column in Table 2, the strict meritocratic selection procedure results in substantial under-representation of minorities. Indeed, a goal of applicant population parity was accomplished only with admission of all applicants. In addition, to accomplish U.S. population parity (16 %) is impossible by this procedure.

Minority quota selection

The results of meritocratic, minority quota selection are presented in Table 3. The row entries in Table 3 reflect the results of separate admission standards for White and minority applicants. As can be seen from Table 3, to meet a goal of applicant parity, the admission standard for minorities apparently needs to be about 15 percent less than the standard for Whites. Parity with the U.S. population (16%) appears to require increasing discrepancy from the White admission standard as the admission standard for Whites decreases (or as the percentage of total applicants admitted increases).

Poverty quota selection

The results of meritocratic, poverty quota selection are presented in Table 4. The row entries in Table 4 reflect the results of separate admission standards for above and below poverty applicants. To meet a goal of applicant parity (i.e., minority representation), the admission standard for below poverty applicants apparently needs to be at least

Table 2

Results of Strict Meritocratic Selection

Admission Standard[a/]	Admissions	Successes[b/]	False Positives[c/]	Misses[d/]	Minority Representation[e/]
85	18	17	1	4,717	0(%)
80	135	113	22	4,621	.7
75	436	338	98	4,396	1.1
70	861	628	223	4,106	.6
65	1,562	1,129	433	3,605	1.8
60	2,538	1,749	789	2,985	1.9
55	3,647	2,364	1,283	2,370	2.0
50	4,878	3,017	1,861	1,717	2.9
45	6,045	3,559	2,486	1,175	3.4
40	7,097	3,972	3,125	762	4.0
35	7,903	4,162	3,741	572	4.7
30	8,712	4,474	4,238	260	5.1
25	9,217	4,608	4,609	126	5.7
20	9,540	4,669	4,871	65	6.3
15	9,779	4,705	4,074	29	6.7
10	9,875	4,724	5,151	10	6.9
5	9,955	4,733	5,222	1	7.2
None	10,000	4,734	5,266	0	7.4

a/Indicates the minimum predicted probability of success required for admission.

b/Indicates the number of total admission who displayed success after entry.

c/Indicates the number of total admissions who failed to display success after entry.

d/Indicates the number of applicants not admitted who would have succeeded had they been admitted.

e/Indicates the percentage of under-represented minority applicants in the total admissions.

Table 3

Results of Meritocratic, Minority Quota Selection

Admission Standard a/ for Whites	Admission Standard a/ for Minorities	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	Whites Not Admitted with Scores Higher than Minority
80	75	139	117	22	4617	3.6	318
	70	139	117	22	4617	3.6	722
	65	163	132	31	4602	17.8	1399
	60	181	145	36	4589	25.9	2357
75	70	436	338	98	4396	1.1	425
	65	460	353	107	4381	6.3	1102
	60	478	366	112	4368	9.8	2060
	55	504	386	118	4348	14.5	3143
	50	571	428	143	4306	24.5	4307
	45	638	459	179	4275	32.4	5407
70	65	885	643	242	4091	3.2	718
	60	903	656	247	4078	5.2	1635
	55	929	676	253	4058	7.8	1718
	50	996	718	278	4016	14.1	3882
	45	1063	749	314	3985	19.5	4982
	40	1139	785	354	3949	24.8	5958
	35	1228	835	393	3899	30.3	6775
65	60	1580	1142	438	3592	2.9	958
	55	1606	1162	444	3572	4.5	2041
	50	1673	1204	469	3530	8.7	3205
	45	1740	1235	505	3499	11.9	4305
	40	1816	1271	545	3463	15.5	5281
	35	1905	1321	584	3413	19.5	6098
	30	1973	1353	620	3381	22.3	6739
	25	2060	1393	667	3341	25.5	7157

Table 3 (continued)

Admission Standard a/ for Whites	Admission Standard a/ for Minorities	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	Whites Not Admitted with Scores Higher than Minority
60	55	2564	1769	795	2965	2.8	1083
	50	2631	1811	820	2923	5.3	2247
	45	2698	1842	856	2892	7.7	3347
	40	2774	1878	896	2856	10.2	4323
	35	2863	1928	935	2806	13.0	4853
	30	2931	1960	971	2774	15.0	5781
	25	3018	2000	1018	2734	17.5	6199
	20	3096	2018	1078	2716	19.5	6444
	15	3147	2036	1111	2698	20.8	6632
	10	3177	2050	1127	2684	21.6	6698
	5	3204	2059	1145	2675	22.3	6751
	none	3231	2060	1171	2674	22.9	6769
55	50	3714	2406	1308	2328	3.8	1164
	45	3781	2437	1344	2297	5.5	2264
	40	3857	2473	1384	2261	7.3	3240
	35	3946	2523	1423	2211	9.4	4057
	30	4014	2555	1459	2179	11.0	4698
	25	4101	2595	1506	2139	12.9	5116
	20	4179	2613	1566	2121	14.5	5361
	15	4230	2631	1599	2103	15.5	5549
	10	4260	2645	1615	2089	16.1	5615
	5	4287	2654	1633	2080	16.6	5668
	none	4314	2655	1659	2079	17.2	5686
50	45	4945	3048	1897	1686	4.2	1100
	40	5021	3084	1937	1650	5.6	2076
	35	5110	3134	1976	1600	7.3	2893
	30	5178	3166	2012	1568	8.5	3534
	25	5265	3206	2059	1528	10.0	3952

Table 3 (continued)

Admission Standard a/ for Whites	Admission Standard a/ for Minorities	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	Whites Not Admitted with Scores Higher than Minority
(50)	20	5343	3224	2119	1510	11.3	4197
	15	5394	3242	2152	1492	12.2	4385
	10	5424	3256	2168	1478	12.6	4451
	5	5451	3265	2186	1469	13.0	4504
	none	5478	3266	2212	1468	13.5	4522
45	40	6121	3595	2526	1139	4.6	976
	35	6210	3645	2565	1089	6.0	1793
	30	6278	3677	2601	1057	7.0	2434
	25	6365	3717	2648	1017	8.3	2852
	20	6443	3735	2708	999	9.4	3097
	15	6494	3753	2741	981	10.1	3285
	10	6524	3767	2757	967	10.5	3351
	5	6551	3776	2775	958	10.9	3404
	none	6578	3777	2801	957	11.5	3422
40	35	7186	4022	3164	712	5.2	817
	30	7254	4054	3200	680	6.1	1458
	25	7341	4094	3247	640	7.2	1876
	20	7419	4112	3307	622	8.2	2121
	15	7470	4130	3340	604	8.8	2309
	10	7500	4144	3356	590	9.1	2375
	5	7527	4153	3374	581	9.5	2428
	none	7554	4154	3400	580	9.8	2446

Table 3 (continued)

Admission Standard a/ for Whites	Admission Standard a/ for Minorities	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	Whites Not Admitted with Scores Higher than Minority
35	30	8071	4294	3777	440	5.5	641
	25	8158	4334	3824	400	6.5	1059
	20	8236	4352	3884	382	7.3	1304
	15	8287	4370	3917	364	7.9	1492
	10	8317	4384	3933	350	8.2	1558
	5	8344	4393	3951	341	8.5	1611
	none	8371	4394	3977	340	8.8	1629

a/ Indicates the minimum predicted probability of success required for admission.
b/ Indicates the number of total admission who displayed success after entry.
c/ Indicates the number of total admissions who failed to display success after entry.
d/ Indicates the number of applicants not admitted who would have succeeded had they been admitted.
e/ Indicates the percentage of under-represented minority applicants in the total admissions.
f/ Indicates the total number admitted out of 10,000 applicants.

Table 4

Results of Meritocratic, Poverty Quota Selection

Admission Standard a/ for Above Poverty	Admission Standard a/ for Below Poverty	Special Admissions g/	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	# Above Poverty Not Admitted With Higher Scores	
								Minority	White
80	75	17	152	120	32	4614	.7	4	280
	70	39	174	137	37	4597	.02	4	683
	65	88	223	176	47	4558	1.8	25	1314
	60	130	265	200	65	4534	2.6	40	2233
	55	160	295	211	84	4523	4.7	59	3293
	50	239	374	240	134	4494	8.6	108	4396
	45	339	474	279	195	4455	10.1	159	5412
	40	422	557	315	242	4419	13.5	208	6332
75	70	22	458	355	103	4379	1.1	0	403
	65	71	507	394	113	4340	1.6	21	1034
	60	113	549	418	131	4316	2.0	36	1953
	55	143	579	429	150	4305	3.1	55	3013
	50	222	658	458	200	4276	5.5	104	4116
	45	322	758	497	261	4237	6.9	155	5132
	40	405	841	533	308	4201	9.4	204	6052
	35	505	941	607	334	4127	12.3	256	6806
70	65	49	910	667	243	4067	.9	21	631
	60	91	952	691	261	4043	1.2	32	1550
	55	121	982	702	280	4032	1.8	55	2610
	50	200	1061	731	330	4003	3.4	104	3713
	45	300	1161	770	391	3964	4.5	155	4729
	40	383	1244	806	438	3928	6.4	204	5649
	35	483	1344	830	514	3904	8.6	256	6403
	30	546	1407	839	568	3895	10.2	297	7008
	25	619	1480	864	616	3870	13.0	335	7402

Table 4 (continued)

Admission Standard a/ for Above Poverty	Admission Standard a/ for Below Poverty	Special Admissions g/	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	# Above Poverty Not Admitted With Higher Scores	
								Minority	White
65	60	42	1604	1153	451	3581	2.0	15	919
	55	72	1634	1164	470	3570	2.4	34	1979
	50	151	1713	1193	520	3541	3.3	83	3082
	45	251	1813	1232	581	3502	4.0	134	4098
	40	334	1896	1268	628	3466	5.3	183	5018
	35	434	1996	1292	704	3442	6.9	235	5772
	30	497	2059	1301	758	3433	8.0	276	6377
	25	570	2132	1326	806	3408	10.0	314	6771
	20	619	2181	1337	884	3397	11.6	351	7008
60	55	30	2568	1760	808	2974	2.1	19	1060
	50	109	2647	1789	858	2945	2.7	68	2163
	45	209	2747	1828	919	2906	3.2	119	3179
	40	292	2830	1864	966	2870	4.1	168	4099
	35	392	2930	1888	1042	2846	5.2	220	4853
	30	455	2993	1897	1096	2837	6.0	261	5458
	25	528	3066	1922	1144	2812	7.4	299	5852
	20	577	3115	1933	1182	2801	8.6	336	6089
55	50	79	3726	2393	1333	2341	2.4	49	1103
	45	179	3826	2432	1394	2302	2.8	100	2119
	40	262	3909	2468	1441	2266	3.4	149	3039
	35	362	4009	2492	1517	2242	4.3	201	3793
	30	425	4072	2501	1571	2233	4.9	242	4398
	25	498	4145	2526	1619	2208	6.0	280	4792
	20	547	4194	2537	1657	2197	6.9	317	5029
	15	591	4238	2552	1686	2182	7.5	337	5204
	10	612	4259	2558	1701	2176	7.9	351	5265
50	45	100	4978	3056	1922	1678	3.1	51	1016
	40	183	5061	3092	1969	1642	3.6	100	1936
	35	283	5161	3116	2045	1618	4.3	152	2690
	30	346	5224	3125	2099	1609	4.7	193	3295
	25	419	5297	3150	2147	1584	5.6	231	3689

Table 4 (continued)

Admission Standard a/ for Above Poverty	Admission Standard a/ for Below Poverty	Special Admissions g/	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	# Above Poverty Not Admitted With Higher Scores	
								Minority	White
(50)	20	468	5346	3161	2185	1573	6.3	268	3926
	15	512	5390	3176	2214	1558	6.8	288	4101
	10	533	5411	3182	2229	1552	7.1	302	4162
	5	545	5423	3183	2240	1551	7.3	317	4215
45	40	83	6128	3595	2533	1139	3.8	49	920
	35	183	6228	3619	2609	1115	4.4	101	1674
	30	246	6291	3628	2663	1106	4.7	142	2279
	25	319	6364	3653	2711	1081	5.5	180	2673
	20	368	6413	3664	2749	1070	6.1	217	2910
	15	412	6457	3679	2778	1055	6.5	237	3085
	10	433	6478	3685	2793	1049	6.7	251	3146
	5	445	6490	3686	2804	1048	6.9	266	3199
	none	459	6504	3686	2818	1048	7.1	280	3216
40	35	100	7197	3996	3201	738	4.4	52	754
	30	163	7260	4005	3255	729	4.8	93	1359
	25	236	7333	4030	3303	704	5.4	131	1753
	20	285	7382	4041	3341	693	5.9	168	1990
	15	329	7426	4056	3370	678	6.3	188	2165
	10	350	7447	4062	3385	672	6.5	202	2226
	5	362	7459	4063	3396	671	6.6	217	2279
	none	376	7473	4063	3410	671	6.8	231	2296
35	30	63	7966	4271	3695	463	5.0	41	605
	25	136	8039	4296	3743	438	5.6	79	999
	20	185	8088	4307	3781	427	6.0	116	1236
	15	229	8132	4322	3810	412	6.4	136	1411

Table 4 (continued)

Admission Standard a/ for Above Poverty	Admission Standard a/ for Below Poverty	Special Admissions g/	Total Admissions f/	Successes b/	False Positives c/	Misses d/	Minority Representation e/	# Above Poverty Not Admitted With Higher Scores	
								Minority	White
	10	250	8153	4328	3825	406	6.6	150	1472
	5	262	8165	4329	3836	405	6.7	165	1525
	none	276	8179	4329	3850	405	6.9	179	1542

a/ Indicates the minimum predicted probability of success required for admission.
b/ Indicates the number of total admission who displayed success after entry.
c/ Indicates the number of total admissions who failed to display success after entry.
d/ Indicates the number of applicants not admitted who would have succeeded had they been admitted.
e/ Indicates the percentage of under-presented minority applicants in the total admissions.
f/ Indicates the total number admitted out of 10,000 applicants.
g/ Indicates the number of below poverty special admissions who failed to meet the above poverty admission standard.

30 percent less than for above poverty applicants. Furthermore, as the admission standard for above poverty applicants decreases (or as the percentage of total applicants admitted increases) the needed discrepancy in admission standards for parity also appears to increase. A goal of U.S. population parity (16%) apparently requires substantial discrepancies in admissions standards. Indeed, the discrepancies were so large the entries were not feasible for the purpose of Table 4.

Comparative analysis

The issues of costs should be considered in any comparative analysis of the procedures. The costs associated with the procedures are false positive and miss rates. The quota systems also have costs in terms of applicants not admitted with higher predicted probabilities of success than applicants admitted by reduced standards. In addition, the ability of the procedure to meet a goal should be weighed.

Goals. All of the procedures incorporated meritocratic selection. Therefore, maximization of success rates, mimimization of false positive rates, and minimization of miss rates were inherent in each procedure. As would be expected, the strict meritocratic procedure is the most efficient for a meritocratic goal. The quota systems display similar efficiencies with respect to a meritocratic goal, with the advantage apparently a function of the discrepancy.

When a meritocratic goal is concomitant with a parity goal, a much different pattern of relative efficiency emerges. Clearly, the strict meritocratic selection procedure is incompatible with a parity goal. Therefore, the strict meritocratic procedure was assigned least efficient status.

Cost comparison of quota selection procedures. When parity goals are accomplished, the costs associated with the meritocratic, minority quota system are generally less than the costs associated with the meritocratic, poverty quota system. That is, the minority quota system appeared to yield a higher success rate, a lower false positive rate, a lower miss rate, and lower alienation (i.e., applicants not admitted with higher predicted probabilities of success than applicants admitted by reduced standards) than the poverty quota system in the presence of parity. The one conflicting outcome of the cost comparisons was that all of the alienated applicants were White for the minority quota system. However, the poverty quota system appeared to require the alienation of more White applicants than did the minority quota system in the presence of parity.

Summary Conclusions

Any review of this problem will surely conclude that any solution will be expensive, divisive, and difficult to implement. The source of the difficulty is the lower admission test scores and past academic performance levels of minorities. The best solution for the problem would consist of some method of increasing minority achievement. Regrettably, the realistic outlook for this solution is that too great a time period will be required.

All other solutions increase the incidence of false positives (admissions that fail to perform) and misses (rejecting who would succeed) and/or alienate some group. In any case, the issues relating to the costs of various forms of alienation; goals for programs; costs of

errors; the roles of the institution, government, and society; and optional methods of financing the costs should be considered.

It is desirable to improve the power of the relationship of pre-selection attributes to success. The inclusion of environmental, affective, and behavioral measures in the set of pre-selection attribute variables should be beneficial. If a meritocratic selection system is used in any way (i.e. in combination with another technique), the amount of error currently associated with the rankings should be reduced.

Given a goal of parity for minority admissions, the quota system provides the least cost in terms of false positives and reserved placements. The arbitrary nature of this goal requires justification that only tangentially relates to the validity of admissions tests and selection procedures. The majority of the justification of such a goal must find foundations in social-political values.

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